The Second Daily Question

(due September 12, 2005) Let $\Sigma = \{\mathsf{a}, \mathsf{b}, \mathsf{c}\}$. Let A be the language "Every a is followed immediately by a b." Let B be the language "Every b is preceded immediately by an a." Draw state transition diagrams for finite automata that recognize languages A and B. Call these machines M_A and M_B. Now, draw a state transition diagram for the product automaton of machines M_A and M_B, and call this $M_{A \times B}$. Label all of the states of $M_{A \times B}$, and indicate the initial state of each machine.

1. What are the accepting states of $M_{A \times B}$ if we want to recognize the language $A \cup B$?

2. What are the accepting states of $M_{A \times B}$ if we want to recognize the language $A \cap B$?

3. What are the accepting states of $M_{A \times B}$ if we want to recognize the language $A \oplus B$, where $\oplus$ represents symmetric set difference (i.e. corresponds to logical exclusive-OR)?